What is claimed is:

1. A method for increasing the storage capacity of a disk drive, comprising the steps of:

providing a magnetic storage disk within the disk drive;

providing said magnetic storage disk with a plurality of data tracks, wherein each of the plurality of data tracks has an independent write fault gate threshold.

2. The method of claim 1 wherein the write fault gate threshold is derived.

3. The method of claim 1 including deriving a position error signal (PES) from a measured repeatable run out (RRO) signal and a non-repeatable run out (NRRO) signal; and

deriving each said derived write fault gate thresholds from said PES.

4. The method of claim 3 including measuring a signal magnitude for each of said RRO and NRRO signals for a transducer stroke across said disk.

5. The method of claim 4 including deriving said PES as a root mean square (rms) of said RRO and NRRO signals.

6. The method of claim 5 including decreasing said PES across the stroke moving from an outer diameter of said disk toward an inner diameter of said disk.

7. The method of claim 1 including varying the magnitude for each said derived write fault gate provided each data track across a transducer stroke moving between an outer diameter of said disk and an inner diameter of said disk.

8. The method of claim 2 including deriving a position error signal (PES) from a measured repeatable run out (RRO) signal and a non-repeatable run out (NRRO) signal; and deriving each said derived write fault gate thresholds from said PES.

9. The method of claim 8 including measuring a signal magnitude for each of said RRO and NRRO signals for a transducer stroke across said disk.

10. The method of claim 9 including deriving said PES as a root mean square (rms) of said RRO and NRRO signals.

11. The method of claim 10 including decreasing said PES across the stroke moving from an outer diameter of said disk toward an inner diameter of said disk.

12. The method of claim 2 including varying the magnitude for each said derived write fault gate provided each data track across a transducer stroke moving between an outer diameter of said disk and an inner diameter of said disk.

13. A method of increasing the storage capacity of a disk drive comprising the steps of:

assembling a disk drive, wherein said disk drive includes at least one disk;

writing a plurality of servo tracks on the surface of said at least one disk;

ascertaining an independent write fault gate for each of a plurality of said servo tracks; and

storing said independent write fault gates in said disk drive.

14. The method of claim 13 wherein said ascertaining step includes measuring a repeatable run out (RRO) signal and a non-repeatable run out (NRRO) signal.

15. The method of claim 14 including deriving a position error signal (PES) from said measured repeatable run out (RRO) signal and a non-repeatable run out (NRRO) signal.

16. The method of claim 15 including measuring a signal magnitude for each of said RRO and NRRO signals for a transducer stroke across said disk.

17. The method of claim 16 including deriving said PES as a root mean square (rms) of said RRO and NRRO signals.

18 A method of servo track writing for a hard disk, comprising the steps of:

assembling a disk drive, wherein said disk drive includes at east one disk, said disk having at least one surface;

writing a plurality of servo tracks on said surface of said lat least one disk;

ascertaining a write fault gate for each servo track before writing the next servo track; and

using the ascertained write fault gate to determine the position of the next servo track.

19. The method of claim 18 wherein said ascertaining step includes measuring a repeatable run out (RRO) signal and a non-repeatable run out (NRRO) signal.

20. The method of claim 19 including deriving a position error signal (PES) from said measured repeatable run out (RRO) signal and a non-repeatable run out (NRRO) signal.

21. The method of claim 20 including measuring a signal magnitude for each of said RRO and NRRO signals for said ascertained write fault gate..

22. The method of claim 21 including deriving said PES as a root mean square (rms) of said RRO and NRRO signals.

23 A method of servo track writing for a hard disk, comprising the steps of:

assembling a disk drive, wherein said disk drive includes at least one disk, said disk having at least one surface;

collecting historical write fault gate data for like hard disks;

writing a plurality of servo tracks on said surface of said lat least one disk;

ascertaining a write fault gate for each servo track from said collected data; and

using the ascertained write fault gates to determine the position of the written servo tracks.

24. The method of claim 23 wherein said ascertaining step includes measuring a repeatable run out (RRO) signal and a non-repeatable run out (NRRO) signal.

25. The method of claim 24 including deriving a position error signal (PES) from said measured repeatable run out (RRO) signal and a non-repeatable run out (NRRO) signal.

26. The method of claim 25 including measuring a signal magnitude for each of said RRO and NRRO signals for said ascertained write fault gate..

27. The method of claim 26 including deriving said PES as a root mean square (rms) of said RRO and NRRO signals.

28. A system for formatting a magnetic storage disk to increase track density, comprising:

a magnetic storage disk having a plurality of data tracks;

a servo track writer (STW) in communication with said disk storage system for deriving variable write fault gate threshold information; and

means for receiving said write fault gate threshold information from said STW and incorporating same on each of said plurality of data tracks, increasing track density for said disk.

29. The system of claim 28 including means for deriving a position error signal (PES) from a repeatable run out (RRO) signal and a non-repeatable run out (NRRO) signal received from said STW;

means responsive to said STW information for deriving each said write fault gate thresholds from said PES, each said write fault gates operative to reduce a track width for each of said data tracks, increasing track density.

30. The system of claim 29 including means for decreasing said PES across a stroke of a transducer moving from an outer diameter of said disk toward an inner diameter of said disk.

31. The system of claim 30 including means for varying each said derived write fault gate in relation to a transducer stroke moving between an outer diameter of said disk and an inner diameter of said disk

32. A hard disk drive comprising:

a housing, including a base plate;

at least one disk mounted on a hub and rotated relative to a base plate, said disk comprising a plurality of tracks for storing data;

an actuator assembly mounted on a shaft and rotated relative to said baseplate, said actuator assembly comprising an actuator arm having a distal end;

a transducer positioned at the distal end of said actuator arm and moveable relative to the surface of said disk; and

a write fault gate that varies across the surface of said at least one disk.

33. The hard disk drive of claim 32, wherein said write fault gate decreases from the outer diameter (OD) of said disk to the inner diameter (ID) of said disk, allowing said data tracks to be positioned closer together nearer the ID of said disk, increasing the data density of said disk.

34. The hard disk drive of claim 32, wherein and independent write fault gate is individually assigned to each of a plurality of said tracks.

35. The hard disk drive of claim 33, wherein each track on said disk surface is associated with an independent write fault gate.

36. The hard disk drive of claim 33, wherein said write fault gate decrease is associated with the decrease in a position error signal (PES) from the outer diameter (OD) of said disk to the inner diameter (ID) of said disk

37. The hard disk drive of claim 36, wherein said position error signal (PES) is a sigma distribution taken as a root mean square of a measured repeatable run out (RRO) signal and a measured non-repeatable run out (NRRO) signal.

38. The hard disk drive of claim 37. wherein said position error signal (PES) may be expressed by the equation:

$$PES_{rms} = [\, (RRO)^2 + (NRRO)^2 \,]^{1/2}$$

where PES_{rms} is the rms position error signal;

RRO is the measured repeatable run out signal; and

NRRO is the measured non-repeatable run out signal.

39. A digital data storage system, comprising:

at least one data storage disk having at least one data storage surface having a plurality of substantially concentric tracks for storing digital data, each said track having an ideal shape and an actual written shape;

at least one transducer for use in writing digital data to said at least one data storage surface;

means for developing a position error signal (PES) for each of said plurality of tracks, said PES indicative of an offset of said actual written shape with respect to said ideal shape for a selected one of said plurality of tracks and operative for situating said at least one transducer to approximate said ideal shape; and

means for deriving a separate write fault gate threshold for each of said tracks from said PES, said write fault gate threshold operative to prevent said transducer from performing a write operation to a selected track when said write fault gate threshold of such selected track is exceeded by said transducer.

40. The digital data storage system of claim 39 wherein said deriving means includes deriving a separate PES value with respect to each track.

41. The digital data storage system of claim 40 wherein said derived PES values are decreasing in magnitude with respect to each track as the transducer moves across the tracks from an outer diameter to an inner diameter of said disk.

42. The digital data storage system of claim 41, further including developing a repeatable run-out (RRO) and a non repeatable run-out (NRRO) value for each track for use in deriving said PES values.

43. The disk drive system of claim 42 wherein said derived PES values are the root mean square values of the RRO and the NRRO values for each track.

44. The disk drive system of claim 43 wherein said position error signal (PES) may be expressed by the equation:

$$PES_{rms} = [\ (RRO)^2 + (NRRO)^2\ ]^{1/2}$$

where PES_{rms} is the rms position error signal;

RRO is the measured repeatable run out signal; and

NRRO is the measured non-repeatable run out signal.

45. A method of servo track writing for a disk drive, comprising the steps of:

assembling a population of like disk drives, wherein each drive includes at least one disk, each said disk having at least one surface with an inner and an outer diameter;

establishing a common position error signal (PES) curve between said inner and said outer diameter for each of said population of like drives;

developing a variable track-spacing profile from said common PES curve; and

implementing said variable track-spacing profile on each of said population of like disk drives.

46. A method of servo track writing for a hard drive, comprising the steps of:

assembling a disk drive, wherein said drive includes at least one disk and an associated transducer, said disk having at least one surface with an inner and an outer diameter;

measuring a position error signal (PES) at several points between said inner and outer diameters using a servo track writer (STW);

calculating a variable track-spacing profile based on a worst case PES measurement for a transducer in said drive; and

writing said profile to said drive with said STW.

47. A method of servo track writing for a hard drive, comprising the steps of:

assembling a disk drive, wherein said drive includes a plurality of disks, each disk having an associated transducer, each said disk having at least one surface with an inner and an outer diameter;

measuring a position error signal (PES) for each of said disks at several points between said inner and outer diameters using a servo track writer (STW);

calculating a variable track-spacing profile based on said PES measurement for each said associated transducer in said drive; and

writing said profile for each said transducer to each said associated surface with said STW.